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ORIGINAL ARTICLE

Caries experience in a child population in a deprived area of Brazil, using ICDAS II

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Abstract The aim of the present study was to assess the caries experience of children aged 6 to 7 years old in a socially deprived suburban area of Brazil's Federal District, using the ICDAS II system and to investigate determinants of dental caries. The survey was carried out in six public schools by three calibrated examiners, on a sample of 835 children. ICDAS II codes had to be converted into dmf/DMF components at surface and tooth levels, resulting in unfamiliar caries variables, to enable some meaningful reporting of the findings. The prevalence of dental caries, including enamel and dentinal carious lesions, in primary teeth was 95.6% and in permanent teeth it was 63.7%. Mean values of d_2mf_2-t (enamel and dentinal lesions), d_3mf_3-t (dentine lesions), D_2MF_2-T and D_3MF_3-T indices were 6.9±3.8, 3.2±3.4, 1.7±1.6 and 0.2±0.5, respectively. Enamel carious lesions predominated in the dmf-t/s and DMF-T/S indices. Seven-year-old children had statistically significantly more enamel and dentine carious lesions in permanent teeth than 6-year-old children had. Using ICDAS II, the prevalence of dental caries in both dentitions was very high. In both dentitions, the decay component predominated, with hardly any restorations or extractions observed. The new ICDAS II system leads to overvaluation of the seriousness of dental caries experience and made reporting of outcomes cumbersome. Guidelines on analysing data and reporting results should be agreed upon before this system can be used in epidemiological surveys globally.

Keywords ICDAS II · DMF · Caries epidemiology · Caries prevalence · Caries experience · Brazil

Introduction

Oral health policies should ideally be aimed at solving oral health problems at community level. A well-conducted epidemiological survey portrays the oral health status of a specific population at a certain point in time and thus, is an important tool upon which public spending for oral care can be based. Such surveys are essential for the development and implementation of effective oral health care programmes [1].

Schoolchildren have long been the focus of preventive programmes aimed at preventing carious lesion development and retarding its progression in the earlier stages [2, 3]. Managing enamel carious lesions through preventive and promotional activities, at the childhood stage, would be economically advantageous because these lesions would not demand complex treatments and more people would be educated in maintaining their teeth into adulthood [4].

In 2008, the University of Brasilia started an investigation into the cost-effectiveness of three oral healthcare management approaches aimed at children from public schools in a socio-economically deprived area of Brazil's Federal District. However, children in this community had never undergone systematic oral investigations. Therefore,

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an epidemiological survey was required to identify children suitable for inclusion in the oral health care management comparison study.

In recent years, a new system for caries assessment has been developed which codes range from the first visual change in enamel to an extensive cavity in dentine (ICDAS II). Its reliability, sensitivity and specificity have been assessed as being good [5, 6]. ICDAS II should be seen as a reaction to the decrease in caries prevalence in many population groups and the subsequent need for assessment of enamel carious lesions [7]. The current format of the DMF index, used in caries epidemiological surveys since 1939, is unable to provide that information [8].

Considering the importance of assessing dental caries in all its manifestations and the fact that no epidemiological survey using ICDAS II had been published covering Brazilians, in early 2009 it was decided that this system be used in the epidemiological survey planned in relation to the cost-effectiveness study.

The aim of this investigation was to report on the dental caries situation in school children in a deprived area of Brazil, using ICDAS II. Secondly, determinants of dental caries were investigated.

Materials and methods

Study population The survey was conducted in Paranoá, a suburban area of Brazil's Federal District. The area is 28 km from the centre of Brasília, the capital city, and is inhabited by 63,000 people with a mean per capita income of €137 per month, according to government data from 2008 [9].

The epidemiological survey was part of the cost-effectiveness study approved by the Research Ethics Committee of the Brasilia Medicine School, reference 081/2008, and was registered at the Dutch Trial Registration Centre, with reference number 1699. All children aged 6 to 7 years and registered in grades 1 and 2 at the six public schools of Paranoá were invited to participate in the study. Information about the oral examination was given to children and their parents. An informed consent form explaining the voluntary nature of participation and the content of the survey was also presented to them. Children whose parents did not sign the consent form and those with special needs that prohibited an oral examination were excluded from the survey.

Calibration of examiners The oral examination was carried out by three trained and calibrated dentists. ICDAS II, which consists of a two-digit coding system, was used in diagnosing caries experience. The first line of digits refers to the presence of sealants or restorations (codes range from 0 to 8) and the second line of digits, to the various stages of carious lesion progression (codes range from 0 to 6). Four special two-digit codes complete the index (Table 1). The method of training for ICDAS II was based on the programme proposed by the ICDAS Committee and was carried out as follows: 1 day of theory based on the e-learning CD [10] available on the ICDAS website; 5 days of calibrating the examiners, using five children each day; 5 days of determining the reliability of using ICDAS II amongst the three examiners, on ten 6- to 7-year-old children per day. The examiners were supervised by an experienced epidemiologist. During those days, calibration of examiners and reliability testing were also done for the other oral conditions assessed, such as visible plaque, gingival bleeding, pits and fissures morphology, measurement of dentinal cavities and the pufa index.

Examination The examinations were conducted at schools from March 16th to June 30th, 2009 and were interrupted by a month-long strike by teachers. A dental unit with a functioning operation light and a three-way syringe was available in two schools. In the remaining four schools a portable examination bed and a portable source of operating light were available, while a portable compressor provided pressurised air. Each examiner was assisted by a trained recorder.

All participating children were submitted to the following sequence of examinations: assessment of toothache, assessment of plaque according to the visible plaque index [11], assessment of gingival condition according to the gingival bleeding index [12], classification of pits and fissure morphology for first permanent molars [13], caries diagnosis according to ICDAS II in primary and permanent teeth, measurement of the size of dentinal cavities in primary teeth and consequences of untreated cavities in accordance with the pufa/PUFA index [14].

After the assessment of visible plaque and gingival bleeding, children had their teeth brushed by the examiner. No toothpaste was used, in line with the instructions of the ICDAS Committee. Proximal tooth surfaces were also flossed, as it was observed during the calibration exercise that this procedure would enable the examiner to better evaluate these surfaces. Any remaining debris was removed with the WHO probe and/or gauze.

Reliability of data collection Intra- and inter-examiner reliability in diagnosing carious lesions and assessing sealants and restorations in primary and permanent dentitions was determined, using 7.8% of the children and kappa coefficients. The results are presented in Table 2 and show a high level of reliability.

Table 1 Codes and description of ICDAS II

1st digit codes	Description	2nd digit codes	Description
0	Sound	0	Sound
1	Sealant, partial	1	First visual change in enamel
2	Sealant, full	2	Distinct visual change in enamel
3	Tooth colored restorations	3	Localized enamel breakdown
4	Amalgam restoration	4	Underlying dark shadow from dentin
5	Stainless steel crown	5	Distinct cavity with visible dentin
6	Porcelain or gold or PFM crown or veneer	6	Extensive distinct cavity with visible dentin
7	Lost or broken restoration		
8	Temporary restoration		
Special codes	Description		
96	Tooth surface cannot be examined		
97	Tooth missing because of caries		
98	Tooth missing for other reasons		
99	Unerupted		

Statistical analysis All collected data were inserted into a data entry programme specially designed for the epidemiological survey. The database was exported to an Excel file and checked for accuracy. The analyses were done by an oral statistician using SAS version 9.2 software.

ICDAS II codes were converted into the components of dmf-s/DMF-S indices, in order to calculate caries experience in the following ways. The d/D-component consisted of a d_2/D_2-component, comprising codes 1 to 6, and a d_3/D_3-component, comprising codes 4 to 6. The f/F-component consisted of a f_2/F_2-component that included fillings with neither an enamel nor a dentine carious lesion diagnosed on the same tooth surface, and of a f_3/F_3-component that included fillings with no dentine carious lesion diagnosed on the same tooth surface. This meant that for fillings diagnosed in conjunction with carious lesions, codes 1 to 6 were added to the d/D-component for the calculation of d_2mf_2-s/D_2MF_2-S counts. For calculating d_3mf_3-s/D_3MF_3-S counts, fillings diagnosed in conjunction with carious lesion codes 1 to 3 were added to the fs/FS-component and fillings diagnosed in conjunction with carious lesion codes 4 to 6 were added to the d/D-component. In that way, three different f/F-components had to be composed: f_2/F_2, f_3/F_3 and f-icdas/F-ICDAS (total number of fillings). It was necessary to make these differentiations as, in contrast to one-digit indices where the examiner decides which code is given to a tooth surface, the two-digit system of ICDAS II leaves that decision to those in charge of analysing the data. In the present investigation, the choices were governed by the rule that preference is given to a dentine carious lesion, over a filling, in case that lesion is situated on the same tooth

Table 2 Intra- and inter-examiner reliability (kappa coefficients and percentage of correct observed scores) of diagnosing dental caries according to ICDAS II in primary and permanent dentitions for sound versus carious lesions and for cavitated versus non-cavitated carious lesions

Examiner	Sound versus carious lesions						Cavitated versus non-cavitated carious lesions			
	N	κ Perm	P_{obs} (%)	*N*	κ Prim	P_{obs} (%)	κ Perm	P_{obs} (%)	κ Prim	P_{obs} (%)
Intra-consistency										
1 - 1	385	0.84	96.9	1,179	0.83	94.1	1.00	100	0.92	98.9
2 - 2	378	0.78	95.2	1,170	0.81	94.2	0.40	99.9	0.81	97.4
3 - 3	20	1.00	100	140	0.97	99.9	1.00	100	1.00	100
Inter-consistency										
1 - 2	1,349	0.47	92.6	4,056	0.72	93.0	0.54	99.9	0.86	98.3
1 - 3	189	0.59	94.2	652	0.79	94.2	1.00	100	0.92	99.9
2 - 3	135	0.76	97.8	576	0.88	97.4	1.00	100	0.96	99.9

N number of tooth surfaces, *κ Perm* kappa coefficient permanent teeth, *κ Prim* kappa coefficient primary teeth, P_{obs} percentage of correct observed scores

surface. A tooth missing due to caries was given a correction factor of 3 surfaces. It means that a missing tooth counted for 3 m/M surfaces in the dmf-s/DMF-S count [15].

Calculating caries experience at tooth level according to ICDAS II without a conversion exercise was not possible, since four or five combinations of two-digit codes could be recorded per tooth, depending on the number of surfaces of each tooth. Regarding the calculation of d_2mf_2-t/D_2MF_2-T counts, the d/D-component was chosen when a carious lesion and a filling were recorded in the same tooth. Teeth presenting only filling codes with no carious lesion recorded at any of the tooth surfaces were scored f_2/F_2. Regarding calculation of d_3mf_3-t/D_3MF_3-T counts, the recording of a code 4 to 6 carious lesion and of a filling in the same tooth was added to the d/D-component. If a carious lesion code 1 to 3 and a code for a filling were recorded for the same tooth or if only a code for filling was recorded, the tooth was scored as f_3/F_3. Calculating f_icdas-t/F_ICDAS-T scores in the same manner as done at surface level was not possible. Therefore, it became impossible to calculate exactly how many fillings per tooth were present because one tooth could present a filling associated to a carious lesion on one surface, as well as a different filling without a carious lesion on another surface. Consequently, only one of these conditions was considered for the caries experience count of that tooth.

The independent variables were gender and age, while the dependent variables were d_2mf_2-s/D_2MF_2-S, d_2mf_2-t/D_2MF_2-T, d_3mf_3-s/D_3MF_3-S and d_3mf_3-t/D_3MF_3-T. ANOVA and the Scheffe's test were used in testing for differences in caries variables between the two genders and between the two age groups. The level of statistical significance was set at α=0.05.

Results

Distribution of subjects The total population of 6- to 7-year-old schoolchildren was 1,136. The sample comprised 835 children (423 boys and 412 girls) with a mean age of 6.3±0.5 years. The frequency distribution of children according to schools was 20.4% (school 1), 11.4% (school 2), 15.5% (school 3), 16.3% (school 4), 11.1% (school 5) and 25.4% (school 6).

Dental caries in the primary dentition The mean number of primary teeth present was 16±2.7. The prevalence of total (primary and secondary) dental caries, including enamel and dentine carious lesions, was 95.6%. Enamel carious lesions (codes 1, 2 and 3) were present in 94.5% of the sample, while the prevalence of dentine carious lesions (codes 4, 5 and 6) was 67.2%. The prevalence and mean scores of all ICDAS II codes recorded for primary dentitions are summarized in Table 3. The prevalence of sealants was very low (0.1%). The mean dmf-s/t scores and standard deviations are presented in Table 4. The mean dmf-t score was mainly attributed to the d_2- and d_3-components, as both the m- and f-components were very low. When enamel carious lesions were included in the d-component, the mean dmf-t score increased by almost 100% more than when only dentine carious lesions were included. Dentine carious lesions were found mainly in first and second molars and upper central incisors. In the maxilla, second molars were more affected than first molars, while first molars were the most affected in the mandible. No statistically significant differences were observed between genders (p=0.46) and between ages (p=0.23) in the mean dmf-s scores.

Dental caries in the permanent dentition The mean number of permanent teeth present was 6±3.4. The prevalence of dental caries, including enamel and dentine carious lesions, was 63.7%. The prevalence of enamel carious lesions (codes 1, 2 and 3) was 62.7% and that of dentine carious lesions (codes 4, 5 and 6) was 10.9%. Table 3 presents the prevalence and mean scores of each of the ICDAS II codes recorded for permanent teeth. The mean DMF-S/T scores and standard deviations are presented in Table 5. The M-component was non-existent and the F-component was extremely low. The mean DMF-S/T scores were almost composed of the D-component only. No statistically significant differences were found between mean DMF-S scores related to gender (p=0.19) but an age effect (p<0.0001) was present in the permanent dentition for D_2MF_2-S. The older the child, the higher was the caries experience (enamel and dentine lesions). Dentine carious lesions were found in 3.3% of permanent teeth and only in first permanent molars. Enamel carious lesions affected 28.3% of the total number of permanent teeth present.

Discussion

Research methodology Caries diagnostic systems usually consist of one-digit codes and computer programmes for analysing the data exist. ICDAS II consists of a two-digit codes system and thus a new programme is required for analysis of the aspects of caries experience derived from many combinations of codes. In this investigation, many combinations had been diagnosed, as a consequence of the population caries load, and it was necessary to report the prevalence and mean scores of these combinations. This scenario led to a long list of figures (Table 3) whose

Table 3 Prevalence, mean numbers and SD of ICDAS II codes in primary and permanent dentitions of 6- to 7-year-old children

ICDAS II codes	Primary dentition		Permanent dentition	
	Prevalence (%)	Mean ± SD	Prevalence (%)	Mean ± SD
00	100.0	57.5±15.7	91.0	21.9±12.9
01	78.2	2.6±2.5	51.3	1.3±1.8
02	78.2	3.0±3.1	32.6	0.6±1.2
03	43.9	0.7±1.1	17.8	0.2±0.6
04	15.8	0.2±0.6	0.2	0.002±0.05
05	64.3	4.5±5.8	10.5	0.2±0.6
06	43.3	2.3±4.3	0.8	0.02±0.4
10	0.1	0.002±0.07	0.1	0.002±0.07
13	–	–	0.1	0.001±0.03
14	–	–	0.1	0.001±0.03
20	–	–	0.4	0.008±0.1
30	10.0	0.4±1.6	0.8	0.01±0.2
32	0.4	0.004±0.08	–	–
33	1.2	0.01±0.19	–	–
34	1.1	0.01±0.14	0.1	0.002±0.07
35	2.9	0.07±0.46	–	–
36	0.7	0.01±0.22	–	–
40	4.4	0.09±0.55	–	–
43	0.5	0.004±0.07	–	–
44	0.1	0.001±0.03	–	–
45	1.1	0.01±0.20	–	–
46	0.1	0.001±0.03	–	–
70	1.1	0.03±0.37	–	–
73	0.1	0.001±0.03	–	–
75	2.1	0.05±0.42	–	–
76	0.8	0.01±0.20	–	–
80	1.4	0.02±0.19	–	–
81	0.2	0.002±0.05	–	–
83	0.2	0.002±0.05	–	–
84	0.4	0.004±0.08	–	–
85	2.4	0.05±0.36	–	–
86	1.5	0.03±0.30	–	–
96	1.2	0.03±0.36	80.4	3.2±2.8
97	8.4	0.6±2.8	–	–
98	1.2	0.06±0.60	0.1	0.005±0.1
99	–	–	100.0	27.7±8.0

SD standard deviation

relevance towards understanding the caries situation in a population group may be questioned. Guidelines on how to analyze the data obtained through ICDAS II were not found, which forced us to make a few decisions based on the manner of analysing epidemiological data from previous studies. We converted the two-digit system into the one-digit system and used the DMF index to accommodate the combination scores. In view of the time and money spent in diagnosing carious lesion progression in detail, as requested by ICDAS II, it was deemed a clear deficiency of the system that it was not immediately possible to report these observations in an easily understandable and pragmatic manner.

As explained in the section on statistical analyses, we experienced difficulties in how to handle fillings at tooth level when they were observed on the same surface in the presence of one or more enamel or dentine carious lesions. This difficulty is absent when the DMF index is used because the decision, whether a condition will be counted as a filling or as a carious lesion, can be made at the time of the examination. We tried to solve this problem with ICDAS II by creating a f_2/F_2, a f_3/F_3 and a f_icdas/

Table 4 Mean number of decayed, missing and filled surfaces (dmf-s)/teeth (dmf-t) in primary dentitions of 6- to 7-year-old children

dmf-s	Mean ± SD	dmf-t	Mean ± SD
d_2-s	13.8±10.9	d_2-t	6.7±3.7
d_3-s	7.3±9.2	d_3-t	2.8±3.1
m-s	0.4±1.7	m-t	0.1±0.6
f_2-s	0.5±1.9	f_2-t	0.1±0.5
f_3-s	0.6±2.0	f_3-t	0.3±0.9
f_icdas-s	0.8±2.6	d_2mf_2-t	6.9±3.8
d_2mf_2-s	14.7±11.6	d_3mf_3-t	3.2±3.4
d_3mf_3-s	8.3±10.0	n_teeth	16.0±2.7
n_surfaces	71.9±11.2		

SD standard deviation, *d_2-s/d_2-t* enamel and dentine lesions, *d_3-s/d_3-t* dentine lesions, *f_2-s/f_2-t* fillings, no carious lesion, *f_3-s/f_3-t* fillings, no dentine carious lesion, *f_icdas-s* fillings, irrespective of carious lesion status

F_ICDAS-component. We are of the opinion that the need for inclusion of these components in future reports should not be necessary as they complicate the reading of such reports. Our conversion exercise showed that ICDAS II is sensitive to interpretation and use of codes, which is unwanted for a caries diagnostic system that is meant to be used internationally.

We had to purchase two portable compressors in order to use ICDAS II in the examination of all schoolchildren since only two of the six schools had a dental unit with compressed air. Regarding the ease of the examination, no difference between the schools with dental units and those with portable equipment was reported by the examiners. However, the need for compressed air will hinder the use of ICDAS II in developing countries. The real necessity of using compressed air in epidemiological surveys should, moreover, be discussed. According to the ICDAS II manual [16], the use of compressed air is essential for detecting caries codes 1 and 3, while caries codes 2, 4, 5 and 6 can be assessed if the tooth is viewed while wet. Considering that both codes 1 and 2 relate to enamel carious lesions with a slight difference in the level of mineral loss [17], which requires the same type of preventive measure [18], the importance of detecting code 1 in epidemiological surveys can be questioned. For caries code 3 (cavity confined to the enamel), the ICDAS II manual reports that this type of lesion is detected after drying the tooth, but, in case of doubt, the WHO probe can be used gently across the surface to confirm the visual assessment. This means that, even without compressed air, code 3 can be detected by sliding the ball end of the WHO probe along the suspect area. Therefore, in order to facilitate the execution of epidemiological surveys, a more practical approach might be not assessing ICDAS II code 1 and using only the WHO probe to diagnose ICDAS II code 3, which would eliminate the need for compressed air. In addition, it was observed that in studies which used the ICDAS II, although enamel carious lesions were being scored separately, the researchers tended to collapse the codes into one when reporting the results [19, 20], in order to facilitate understanding of the outcomes.

Table 5 Mean number of decayed, missing and filled surfaces (DMF-S)/teeth (DMF-T) in permanent dentitions of 6- to 7-year-old children

DMF-S	Mean ± SD	DMF-T	Mean ± SD
D_2-S	2.5±2.8	D_2-T	1.7±1.6
D_3-S	0.2±0.8	D_3-T	0.2±0.5
M-S	0.0	M-T	0.0
F_2-S	0.01±0.2	F_2-T	0.0±0.1
F_3-S	0.01±0.2	F_3-T	0.0±0.2
F_ICDAS-S	0.02±0.2	D_2MF_2-T	1.7±1.6
D2MF-S	2.5±2.8	D_3MF_3-T	0.2±0.5
D3MF-S	0.2±0.9	n_teeth	6.0±3.4
n_surfaces	24.5±14.0		

SD standard deviation, *D_2-S/D_2-T* enamel and dentine lesions, *D_3-S/D_3-T* dentine lesions, *F_2-S/F_2-T* fillings, no carious lesion, *F_3-S/F_3-T* fillings, no dentine carious lesion, *F_ICDAS-S* fillings, irrespective of carious lesion status

ICDAS II was developed because the 'old' DMF index was considered obsolete, as early enamel lesions were not part of the DMF index. With the decrease in caries prevalence, there was a need to diagnose non-cavitated lesions [7]. For that reason, ICDAS II was proposed as an alternative to the DMF index. Nevertheless, researchers have encountered problems in reporting the data, necessitating conversion of ICDAS II codes into DMF components [19, 21] or, as an alternative, to produce a table with a long list of possible combinations of the two digits of the system (Table 3) [19]. This is not straightforward and may make the discussions with policymakers difficult. It would be close to impossible for a public health planner to understand the various caries related prevalence scores as it would be for the oral epidemiologist to explain these. Consequently, the elaboration of oral health programmes as well as the establishment of goals, which are the main reasons for conducting an epidemiological survey, would be compromised. Therefore, the usefulness of ICDAS II in epidemiological surveys should be reconsidered on the grounds that while data is collected in such a detailed manner, it cannot be reported in an easily comprehensible way. Moreover, the description of caries experience restricted to ICDAS II codes does not permit comparison with extensive studies that have used the DMF index.

Another aspect that needs to be addressed is the time required to complete the caries assessment when using

ICDAS II in a caries-active mixed-dentition population like the present one. Even after a calibration period of 2 weeks, the first examinations took a long time to complete. The need to score the combination of the two-digit coding system and the need for drying one tooth surface at a time were found to be the most time-consuming activities. The final diagnosis was reached only after observing the wet surface and then the dried surface, as proposed by the ICDAS Committee [16]. According to a previous study [22], ICDAS II examination took twice as long as examination based on the WHO caries index. In epidemiological surveys with big samples, use of ICDAS II may become a costly undertaking.

In addition to the kappa coefficient, the percentage of correctly observed judgements (P_{obs}) was used to complement the reliability measurement because the kappa statistic is unreliable in low prevalence populations and when only a few number of scores are present for a code, as occurred a few times in the present study. As all P_{obs} readings and most of the kappa coefficients were high, it was concluded that the quality of the data obtained was high.

Considering the kappa coefficients for intra- and inter-examiner consistency in using ICDAS II, the reliability of the results regarding caries experience is considered high. This finding may be attributed to the lengthy and stringent training and calibration exercises that the examiners had undergone.

Main findings The prevalence of caries in the primary dentition of this young child population, including enamel and dentine lesions (95.6%), is considered extremely high. Children from deprived areas are known to be at high-risk regarding caries [23, 24], which could partly explain the high percentage of children affected with dental caries. Other epidemiological surveys using ICDAS II in similarly aged children in deprived communities revealed a caries prevalence of 81% [25] and 100% [26], which is in line with that obtained in the present survey. A somewhat lower caries prevalence (74.7%) was reported in low-income Colombian children, aged 2.5 to 4 years, using ICDAS II [27]. The Colombian children were younger than those in the present study, which would be an obvious reason for the lower caries prevalence percentage. Another reason for the difference in caries prevalence between the Colombian and Brazilian children may have been the absence of ICDAS II code 1 recording in the Colombia study. In the present survey, code 1 was the most prevalent caries code in the primary dentition. The fact that the prevalence of dental caries, diagnosed according to the ICDAS II, was already very high in young children showed the low discriminating power of that system in identifying the level of seriousness of the disease. The fact that the very early sign of dental caries in enamel (code 1) is included in the system appears to be the reason. Although one never knows exactly if ICDAS II code 1 will progress, it has been demonstrated [28] that a considerable number of those lesions will not progress. It is, therefore, very likely that including very early signs of enamel carious lesions in a caries assessment system will overestimate the severity of dental caries. The profession should be asked if they want to communicate to other health professionals and members of society in this manner. Using ICDAS II, an almost 100% prevalence of dental caries in primary teeth was observed at a young age in the present study. The same situation was applicable to caries prevalence in permanent teeth. Already at an age of 6 to 7 years, 63.7% of the children were affected by dental caries. This figure should be considered high, considering the fact that the permanent teeth had been erupted for about 1 year only.

Herein, a mean d_3mf_3-t of 3.2±3.4 was observed, which is in line with the studies conducted among 6-year-old Brazilian children in the last decade. Mean dmf-t scores ranging from 2.4 to 3.1 had been described in the literature [29–31]. It was not possible to compare our results with those published by the Brazilian Health Ministry in 2003 [32] as children aged 6 to 7 years old were not included in their epidemiological survey. In general, the caries status of the sample was higher than expected and did not achieve the goal proposed by WHO for the year 2000, which was 50% of caries-free 6-year-old children, according to the DMF index [33]. Only 32.8% of our children presented a mean d_3mf_3-t score of 0.

The findings confirmed the lack of a system capable of offering curative care for schoolchildren in Paranoá. The m- and f-components were extremely low in comparison to the d-component. Only a few children had received treatment in the primary dentition. For the permanent dentition, practically no treatment was carried out.

In the present survey, girls did not show a higher caries experience than boys, which is common [34]. Only an age effect for D_2MF_2-S was observed. Despite the 1-year age difference, 7-year-old children had more carious lesions in permanent teeth than children aged 6. This finding showed once more that erupting and just-erupted permanent molars are vulnerable to carious lesion development [35].

In summary, a high prevalence of dental caries in both primary and permanent teeth was found, with enamel carious lesions being the most frequent condition detected, showing that using ICDAS II can lead to overvaluation of the seriousness of dental caries experience. Prevalence of dentine carious lesions in the primary dentition was high, but low in the permanent dentition. Extractions due to caries, and restorations were seldom found, indicating the lack of access to oral health care services among schoolchildren in Paranoá.

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Conflict of interest The authors declare that they have no conflict of interest.

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